PB87-189866

Superfund Record of Decision (EPA Region 1)
Kellogg-Deering Well Field
Norwalk, Connecticut, September 1986

(U.S.) Environmental Protection Agency
Washington, DC

25 Sep 86

U.S. Department of Commerce
National Technical Information Service
NTIS

PB87-189866

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R01-86/019
September 1986

EPA

Superfund Record of Decision:

Kellogg-Deering Well Field, CT

REPRODUCED BY
U.S. DEPARTMENT OF COMMERCE
NATIONAL TECHNICAL
INFORMATION SERVICE
SPRINGFIELD, VA 22161

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO.
EPA/ROD/R01-86/019		PB87 189866/AS

4. TITLE AND SUBTITLE	5. REPORT DATE
SUPERFUND RECORD OF DECISION Kellogg-Deering Well Field, CT	September 25, 1986 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT NO
9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELEMENT NO. 11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460	13. TYPE OF REPORT AND PERIOD COVERED Final ROD Report 14. SPONSORING AGENCY CODE 800/00

15. SUPPLEMENTARY NOTES

16. ABSTRACT

The Kellogg-Deering Well Field site, also known as the Smith Well Field, is a 100-acre public supply well field in southwestern Fairfield County, along the western bank of the Norwalk River, Norwalk, CT. The well field is owned and operated by the Norwalk First Taxing District Water Department (NFTD) serving approximately 45,000 people. The primary source of public water supply to the NFTD is surface water from four reservoirs, with ground water as a secondary source. In 1975, trichoroethene (TCE) was discovered in the ground water. Between 1975 and 1980 the Connecticut Department of Environmental Protection performed onsite sampling and initiated investigations at several local industries since the well field is being impacted by contamination outside the site boundaries. The potential primary source of ground water contamination is located to the eastern edge of the site area. Contaminants are migrating with the ground water from areas of high concentration toward the well field. The movement is partially influenced by the pumping of the production wells. TCE is the primary contaminant of concern. Other identified contaminants include: PCE, 1-2-DCE, methylene chloride, xylenes, and benzene.

The selected remedial action for this site involves air stripping of the contaminated ground water and subsequent discharge into the existing conventional water treatment plant and distribution system; and air and ground water monitoring. The estimated capital cost associated with this remedy is $69,751 with annual O&M costs of $52,836.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Kellogg-Deering Well Field, CT Contaminated Media: gw Key contaminants: VOCs, TCE		

18. DISTRIBUTION STATEMENT	19. SECURITY CLASS (This Report) None	21. NO. OF PAGES 44
	20. SECURITY CLASS (This page) None	22. PRICE

EPA Form 2220-1 (Rev. 4-77) PREVIOUS EDITION IS OBSOLETE

RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION
OPERABLE UNIT 1

Site

Kellogg-Deering Well Field
Norwalk, Connecticut

Documents Reviewed

I am basing my decision primarily on the following documents describing the analysis for the cost and effectiveness of the first operable unit remedial alternatives for the Kellogg-Deering Well Field.

- Kellogg-Deering Well Field Remedial Investigation (NUS Corporation, April, 1986)
- Kellogg-Deering Well Field Operable Unit 1 Feasibility Study (NUS Corporation, June 1986)
- Comments from the Connecticut Department of Health Services (July, 1986)
- Summary of Remedial Alternative Selection (September 1986)
- Responsiveness Summary (September 1986)

Description of Selected Remedy

Bring into operation existing air stripping facilities to remove volatile organic compounds from the contaminated groundwater feeding the Kellogg-Deering Well Field. The stripped water will be discharged into the existing conventional water treatment plant and the distribution system. The Operable Unit serves to assure the reliable supply of safe, potable water to the public dependent on the well field.

Declarations

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 C.F.R. Part 300), I have determined that Air Stripping at the Kellogg-Deering Well Field is a cost-effective remedy that provides adequate protection of public health, welfare, and environment. The State of Connecticut has been consulted and agrees with the approved remedy. In addition, the action will require future operation and maintenance activities to ensure the continued effectiveness of the remedy. These activities will be considered part of the approved action and eligible for Trust Fund monies up to 90% of the cost for a period not to exceed one year.

EPA will undertake an additional Remedial Investigation/Feasibility Study to further characterize current and additional potential sources of contamination, and to evaluate remedies to address such sources. If additional remedial actions are determined to be necessary, a record of decision will be prepared for approval of the future remedial action.

9/25/92
Date

Michael R. Deland
Regional Administrator - Region I

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
KELLOGG-DEERING WELL FIELD

SITE LOCATION AND DESCRIPTION

The Kellogg-Deering Well Field Site, also known as the Smith Well Field, is a 10 acre public supply well field in southwestern Fairfield County, along the western bank of the Norwalk River in Norwalk, Connecticut. The site is located 4,000 feet south-southwest of Routes 7 and 15 interchange.

The Kellogg-Deering well field is being impacted by contamination from sources outside of the well field. Under CERCLA, a facility is coextensive with the associated contamination; thus, for legal purposes, the Site in fact includes the upgradient plume that is migrating towards the well field.

The well field is owned and operated by the Norwalk First Taxing District Water Department (NFTD) serving approximately 45,000 people. The primary source of public water supply to the NFTD is surface water from four reservoirs. Reservoir water is blended with well field water at varying ratios depending on reservoir storage and distribution system location. The well field consists of four production wells and a conventional treatment plant contributing between 15 and 35 percent of the NFTD water supply. The four wells are known as Layne 1, Layne 2, Deering 1, and Deering 2.

Groundwater from the well field area is presently used by the NFTD for public water supply. Surface water is the principal source of water supply for the NFTD; hence, the aquifer is not a sole source one. The appropriate groundwater class, for the aquifer underlying the well field, under the EPA Ground Water Protection Strategy is II-A.

Land use varies in the area. Immediately (within 100 feet of the well field property line) west, north, and south of the well field are residential areas. Across the river, east of the well field, is a landfill not presently in use. The area east of the landfill and Deering Pond is part residential and part industrial. Within this area there is an industrial park, a cemetery, and a series of comercial businesses mixed with light industry. The Kellogg-Deering well field and the immediate area east across the river are within the 100 year flood plain of the Norwalk River.

SITE HISTORY

The southern acreage of the Kellogg-Deering well field site has been owned by the NFTD since approximately 1935. Several lots were added in 1936. The northern 7 acre tract was purchased in 1964. The first of the four production wells, Layne 1, was installed in 1955. The other three were installed as follows: Deering 1 in 1965, Deering 2 in 1966, and Layne 2 in 1975.

Trichloroethene (TCE) was discovered in the groundwater in 1975. The NFTD began analyzing groundwater samples from the well field in that year. Between 1975 and 1980 the Connecticut Department of Environmental Protection (DEP) performed several inspections and samplings at the Kellogg-Deering site and initiated investigations of several local industries. The site was promul-

gated to the National Priorities List (NPL) in 1984.

Efforts to determine the extent of contamination, which began with the DEP investigations, continued with the EPA Remedial Investigation. Previous studies showed that the areas north, west, and south of the site could be discounted as potential contaminant sources. For the purpose of characterizing the groundwater contamination plume a study area was developed to include the well field site and the area east of the site (see figure 1).

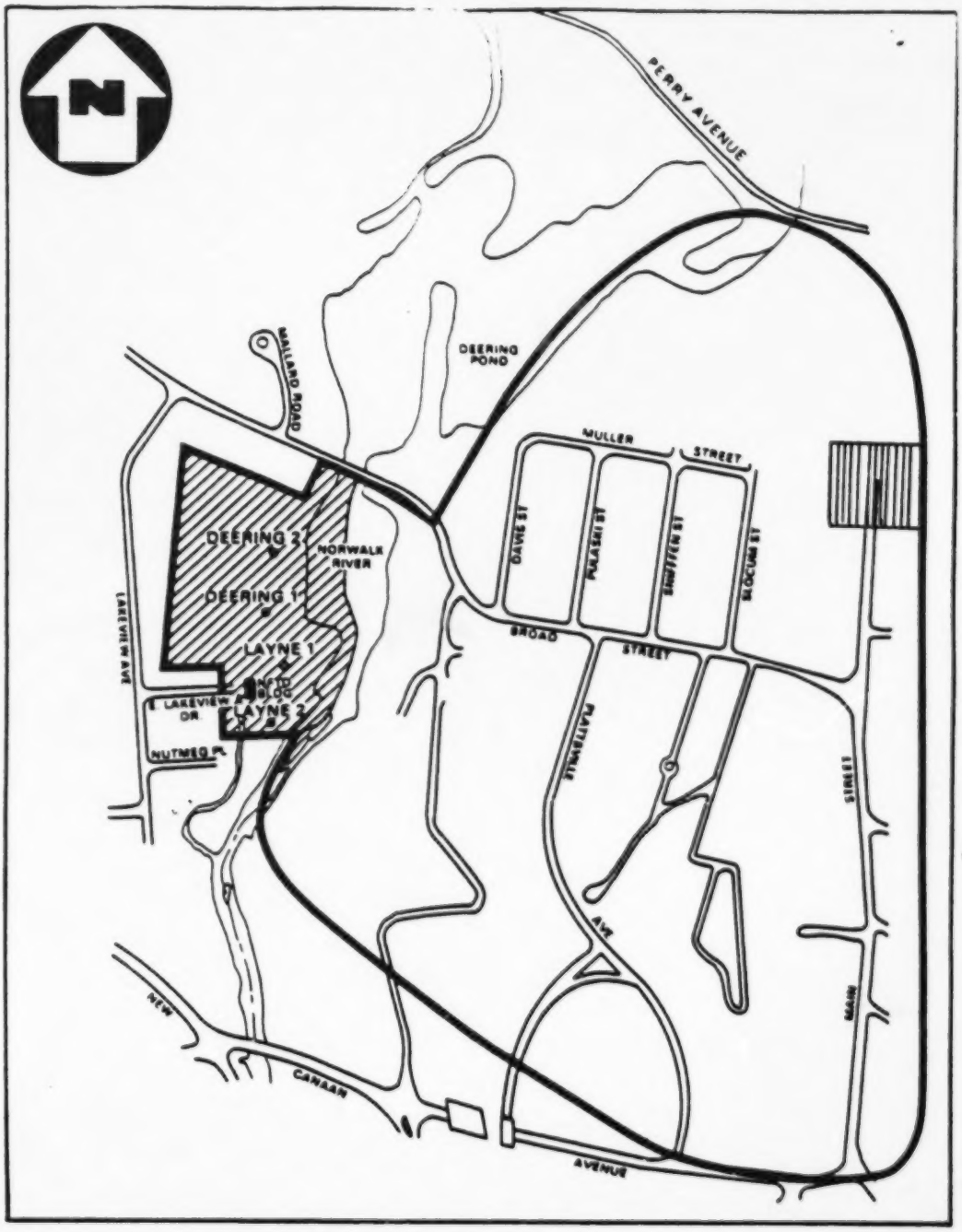
All production wells and several monitoring wells in the study area were sampled between July 1984 and August 1985. EPA's National Contract Laboratory Program (CLP) analyses detected TCE in three of the four production wells. The highest TCE concentration (86 ppb) was detected in Layne 1. Historical data showed a maximum TCE concentration of 600 ppb on Layne 2 in 1980. Appendix A to the RI report presents historical data for all production wells.

In May 1981 a redwood slat aerator was installed on Layne 2 by the NFTD. The aerator consistently removes 65 percent of the volatile organics in the groundwater. A composite sample of well field water after treatment and prior to blending with reservoir water was analyzed in 1984. The composite excluded Layne 1 water which was normally pumped to waste to reduce contaminant levels on the other three wells. It consisted of samples at the point at which wells Deering 1 (raw), Deering 2 (raw), and Layne 2 (aerated) combine. TCE levels in the composite averaged 10 ppb. It was estimated that well field water was blended with reservoir water at a ratio ranging from 1:3 to 1:5. The Superfund Implementation Group, Center for Environmental Health, Centers for Disease Control reviewed the composite data and concluded that it did not appear to be an imminent and substantial endangerment to public health at the time. The EPA thus concluded that no emergency measures were required at the time.

In 1984 the daily production of the surface water system was 5.1 mgd while its safe yield was 5.25 mgd. The NFTD determined that more of the well field safe yield had to be available for public supply in order to guarantee that the surface system's safe yield would not be exceeded. Hence, the NFTD installed in 1985 an air stripper on Layne 1, which is potentially the best yielding well, but the most contaminated one.

Layne 1 is the deepest of the four wells, intercepting the upgradient plume without the full benefit of dilution from the Norwalk River, and therefore showing higher levels of contamination. As mentioned before, such plume is legally considered to be part of the site. Further discussion regarding the contaminant plume follows below in the Current Site Status Section.

The stripper is rated by the manufacturer as being 99 percent efficient, but not yet in operation due to problems with a holding tank. The tank is expected to be repaired during the fall of 1986. The stripper is capable of treating water from any of the four production wells. A diagram of the NFTD water supply system is shown in Figure 2.



STUDY AREA
KELLOGG-DEERING SITE,
NORWALK, CT

Figure 1

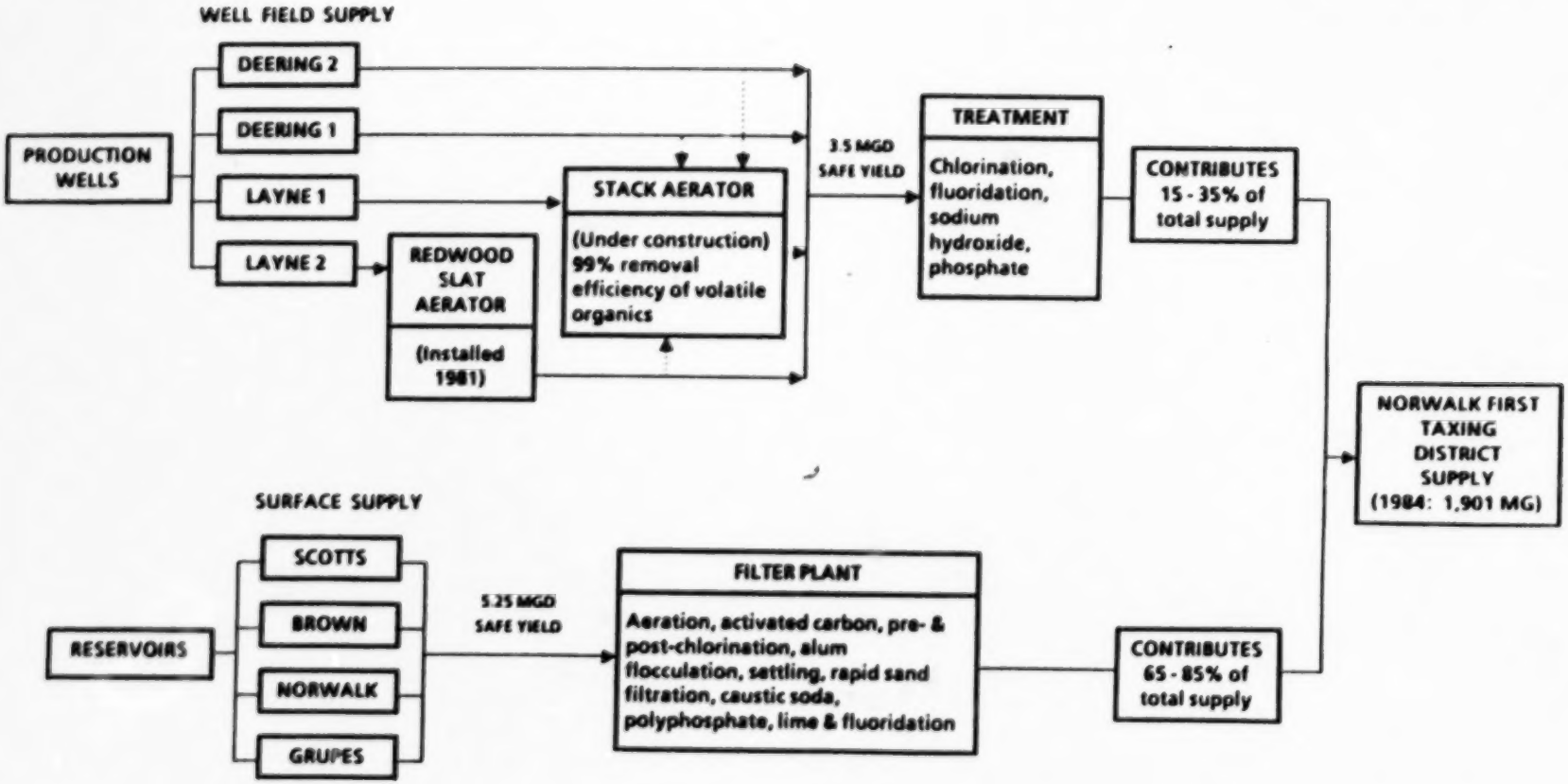


FIGURE 2
KELLOGG-DEERING SITE
WATER SUPPLY SYSTEM
NORWALK FIRST TAXING DISTRICT

NUS CORPORATION
A Halliburton Company

CURRENT SITE STATUS

The population at risk is the approximately 45,000 people served by the NFTD. Environmental concerns are limited to contamination of the unconfined aquifer in the well field and study area. There is no evidence of impact to surface water bodies. Benthic and aquatic organisms do not appear to be at risk. No other welfare concerns have been identified. Primary routes of exposure associated with this site include ingestion of drinking water, and inhalation through showering.

Several chemical substances were detected throughout the study area. Most of them were organic volatiles dissolved in the groundwater. Types of substances, levels detected, and frequency of detection are presented in Table 1. The total amount of contamination at the site is difficult to approximate due to the nature of the site and the type of contamination. TCE, tetrachloroethene (PCE), and 1,2-dichloroethene (1,2-DCE) were detected at the highest concentrations and frequency. TCE is the primary contaminant of concern due to concentration and frequency of detection. Several monitoring wells east of the well field showed high levels of TCE contamination. The highest TCE concentration detected in the groundwater was 100,000 ppb at approximately half a mile east of the well field. Other contaminants of concern detected in the study area include PCE, 1,2-DCE, methylene chloride (DCM), 1,1,1-trichloroethane, benzene, and xylenes.

Maximum TCE concentrations detected at the well field, during the RI, were 86 ppb on Layne 1 and 64 ppb on Layne 2. Historical maximum TCE concentrations range from 300 to 600 ppb at the well field (see Appendix A to the RI report). Other chemicals detected at the well field include DCM, benzene, 1,2-DCE, and chloroform (chloroform was detected in trace amounts).

Of the chemicals detected at the well field, TCE and DCM are classified as probable human carcinogens. Benzene is classified as a human carcinogen. The current estimated incremental lifetime carcinogenic risk of the groundwater at the well field is $1.8 \times 10(-4)$ for adults. This corresponds to a 1.8 in 10,000 chance that a continously exposed adult would develop cancer during his lifetime due to exposure (through ingestion and inhalation) to the chemicals at the concentrations detected at the well field. Other hazardous properties are described on pages 7-5 to 7-12 of the RI report; nevertheless, at the concentrations detected at the well field, only carcinogenic risk are of concern. Concentrations are projected to increase by a factor of ten at the well field over a period of thirty years due to migration of the contaminant plume. This projected increase would raise the risks associated with the groundwater at the well field by one order of magnitude if no additional measures are taken to control or mitigate such an increase.

Most chemicals detected in the Kellogg-Deering study area can undergo anaerobic degradation in the subsurface at varying rates. The ultimate breakdown products of TCE are chloroethane and vinyl chloride. Vinyl chloride has been detected in the study area. The chemicals detected in the study area may not be reused or recycled.

Contamination extends vertically through the overburden and

TABLE 1 Page 1 of 2

CONTAMINANTS DETECTED
KELLOGG - DEERING SITE , NORWALK , CT

CHEMICAL CONTAMINANT	GROUNDWATER		SURFACE WATER		SEDIMENT		SUB-SURFACE SOIL	
	DETECTION FREQUENCY	CONCENTRATION RANGE ug / l	DETECTION FREQUENCY	CONCENTRATION RANGE ug / l	DETECTION FREQUENCY	CONCENTRATION RANGE ug / l	DETECTION FREQUENCY	CONCENTRATION RANGE ug / l
CHLORINATED ALIPHATICS								
TRICHLOROETHENE	83 / 95	2-100,000	2 / 5	4 - 8			3 / 26	2-41
TETRACHLOROETHENE	30 / 95	1-1,500					1 / 26	2
1, 2 - DICHLOROETHENE	61 / 95	1-4,000						
1,1 - DICHLOROETHANE	4 / 95	22-38						
1,1,1 - TRICHLOROETHANE	2 / 95	3-4					1 / 26	1
1,1,2 - TRICHLOROETHANE	1 / 95	630					1 / 26	1
METHYLENE CHLORIDE	18 / 95	1-900			4 / 5	7-9	4 / 26	17-1,500
CHLOROFORM	3 / 95	8-600						
VINYL CHLORIDE	2 / 95	12-136						
MONOCYCLIC AROMATICS								
BENZENE	7 / 95	15-260					1 / 26	4
TOLUENE	10 / 95	2-240					18 / 26	3 - 1,200
XYLENES (TOTAL)	8 / 95	3-590	1 / 5	2	1 / 5	8		
ETHYLBENZENE	2 / 95	72-40					1 / 26	2
PHENOL	1 / 95	72			NA	NA	NA	NA
1,2 - DICHLOROBENZENE	1 / 95	4			NA	NA	NA	NA
KETONES								
ACETONE	11 / 95	8-4,500					3 / 26	19 - 26

TABLE 1 Page 2 of 2

CONTAMINANTS DETECTED
KELLOGG - DEERING SITE , NORWALK , CT

CHEMICAL CONTAMINANT	GROUNDWATER		SURFACE WATER		SEDIMENT		SUB-SURFACE SOIL	
	DETECTION FREQUENCY	CONCENTRATION RANGE ug / l	DETECTION FREQUENCY	CONCENTRATION RANGE ug / l	DETECTION FREQUENCY	CONCENTRATION RANGE ug / l	DETECTION FREQUENCY	CONCENTRATION RANGE ug / l
KETONES								
2 - BUTANONE	3 / 95	5-76					2 / 26	4 5
2 - HEXANONE	1 / 95	24						
PHTHALATE ESTERS								
DI - N - BUTYLPHTHALATE	1 / 95	22	NA	NA	NA	NA	NA	NA
PCBs								
ARCHLOR 1254	1 / 95	0 28	NA	NA	NA	NA	NA	NA
INORGANICS					NA	NA	NA	NA
ALUMINUM	5 / 10	90-162						
BARIUM	1 / 10	68						
CALCIUM	10 / 10	[illegible]						
IRON	8 / 10	32-4,725						
LEAD	8 / 10	7-15						
MAGNESIUM	10 / 10	[illegible]						
MAGNANESE	10 / 10	457-1,107						
POTASSIUM	10 / 10	[illegible]						
SODIUM	10 / 10	[illegible]		[illegible]				
ZINC	9 / 10	[illegible]						

into bedrock. Horizontally, the contamination extends throughout the study area; however, the study area boundaries might not coincide with the exact extent of contamination. Further studies are needed in order to better characterize such extent.

The well field is located in a south trending buried bedrock valley. Depth to bedrock ranges from approximately 100 feet in the well field area to less than 10 feet about half a mile east of the well field. Overburden and bedrock are hydraulically connected. Soils in the area are typicallly sandy. Generally the soils are well drained with moderately rapid permeability (2-6 inches/hour). Very rapid permeabilities (>20 inches/hour) have been observed in some areas. General groundwater flow is to the west, southwest, and northwest. The Norwalk River is not a barrier to groundwater flow; groundwater passes underneath the river to the production wells during periods of pumping.

The potential primary source area of groundwater contamination is located at the eastern edge of the study area shown in Figure 1. TCE concentrations in the groundwater drop steadily downgradient from the area of highest TCE levels, until increases in TCE levels are noted in certain downgradient areas (see section 4.5.5 of the RI). The causes of these rises in TCE concentration cannot be determined based on the available data. Two potential explanations for the anomalous increases have been identified:

- Secondary sources of TCE contamination may be located in the downgradient areas.

- The anomalous increases in TCE concentrations may reflect 'slugs' of more highly contaminated groundwater resulting from separate releases of TCE into the environment.

Contaminants are migrating, with the groundwater, from areas of high concentration toward the well field. This movement is partly influenced by the pumping of the production wells.

ENFORCEMENT ANALYSIS (See Appendix I)

ALTERNATIVES EVALUATION

The response actions at this site have been phased into operable units. An operable unit is a discrete part of the entire reponse action that decreases a release, threat of release, or pathway of exposure. The first operable unit involves the well water treatment and distribution system (i.e. the human pathway of exposure). The second operable unit will serve to further characterize and/or identify potential source areas and to gather sufficient information to determine the necessity for and proposed extent of remedial action to address such source areas.

The primary objective of the Kellogg-Deering well field first operable unit is to protect the public by assuring a reliable supply of safe, potable water to the public currently dependent

on the well field.

A Remedial Investigation/Feasibility Study (RI/FS) was undertaken, for the EPA by NUS Corporation, from June 1984 to June 1986 to determine the nature and extent of the threat presented by the release and to evaluate proposed remedies at the site.

INITIAL SCREENING

The following seven alternatives were developed in the FS report for consideration:

- No Action
- Air Stripping
- Air Stripping plus Air Emissions Treatment
- Activated Carbon Treatment
- Air Stripping plus Activated Carbon
- Air Stripping plus Activated Carbon plus Air Emissions Treatment
- Expansion of Surface Water Treatment Plant

These alternatives were initially screened using the broad criteria specified in section 300.68 (g)(1), (2), and (3) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP):

(1) Cost;
(2) Acceptable Engineering Practices; and
(3) Effectiveness

Two of the seven alternatives were eliminated during initial screening. The two alternatives included air emissions treatment as part of the remedy. Volatile emissions expected from air stripping are less than those requiring treatment as specified by State of Connecticut regulations by approximately one order of magnitude (see Appendix A to the FS report). The two alternatives were screened out on the bases of Acceptable Engineering Practices and Costs. These alternatives do not meet the acceptable engineering criterion since air emissions do not require treatment to meet public health and environmental objectives. In addition, the extra cost of air emissions treatment is not justifiable where the treatment does not provide significantly greater protection.

DETAILED EVALUATION

The remaining five alternatives were analized in detail consistent with the six (i-vi) evaluation criteria in Section 300.68(h)(2) of the NCP. In general these criteria cover the follow-

ing evaluation factors:

(i) Refinement and specification of the alternative in detail.

(ii) Detailed cost estimation.

(iii) Engineering implementation, reliability, and constructability.

(iv) An assesment of the extent to which the the alternative is expected to effectively prevent, mitigate, or minimize threats to, and provide adequate protection of public health and welfare and the environment.

(v) Recyclability of waste and application of innovative, or alternative technologies.

(vi) Adverse environmental impacts.

Further discussion of these criteria is presented in the NCP. The above criteria were consisered for analysis under the following sections or headings in the FS:

(i): Section 3.

(ii): Cost Evaluation.

(iii): Technical Evaluation.

(iv): Public Health Evaluation and Institutional Evaluation.

(v): The contaminants detected at the site are not reusable or recyclable. No innovative, or alternative technologies were identified for the first operable unit. Therefore, it was inappropriate to consider criterion (v) in the detailed analysis of alternatives.

(vi): Environmental Impact Evaluation. For the purpose of this document, criterion (vi) will be considered together with information relating to criterion (iv) under the heading of Public Health and Environmental Concerns.

A summary of the results of the detailed evaluation of alternatives follows below.

Description of Alternatives [§ 300.68(h)(2)(i)]

NO ACTION (Alternative 1)

The no action alternative would involve no new treatment facilities. The present redwood slat tower aerator on Layne 2 would remain in operation as well as the conventional water treatment system (chlorination, flouridation etc.). The packed tower air stripper on Layne 1 would not be brought into service. The current sampling and analysis program would be expanded to include approximately seven monitoring wells located in the unconfined aquifer on the eastern side of the Norwalk River. Monitoring chemical contaminants (mostly volatile organics) on the east side of the river would allow for early detection of possible deterioration in the water producing aquifer; hence, it would provide time to take corrective action at the well field.

AIR STRIPPING (Alternative 2)

For this alternative the stripper on Layne 1 would be brought into service. This stripper has been designed and it is guaranteed to remove 99% of the chlorinated hydrocarbons (e.g. TCE) and 98% of the monocyclic aromatics (e.g. benzene) in the groundwater up to 600 ppb (the historical maximum TCE concentration detected). As part of the FS,the air stipper's design specifications were reviewed to confirm the 99% efficiency rating given by the manufacturer. The air stripper is capable of treating water from any of the four production wells. The water distribution system demand for well water is less than the rated capacity of the production wells; hence, the stripper may not need to operate continously. To accomodate the disparity between system demand and production rate, a large holding tank (750,000 gal) has been installed. Following installation, cracks developed in the tank rendering it unusable and thus preventing the operation of the air stripper. The air stripping alternative includes the holding tank repair and a monitoring program similar to the one for the no action alternative with additional testing of the treatment system's performance. Air monitoring is also included in order to confirm (or not) that air emissions treatment is not required.

AIR STRIPPING PLUS ACTIVATED CARBON (Alternative 3)

This alternative would add an activated carbon treatment system to alternative 2. The carbon treatment system would be installed to handle treated water pumped from the holding tank. The primary function of the activated carbon system would be to provide a safety backup to accommodate potential future contaminant excursions where the concentrations of TCE may exceed 600 ppb, which is the designed performance limit for the new air stripper. To satisfy design criteria for the system characteristics at the Kellogg-Deering well field, six 12-foot-diameter vessels with 12-foot-deep carbon beds would be required. This alternative would also include a monitoring program as discussed in alternative 2.

EXPAND SURFACE WATER TREATMENT SYSTEM (Alternative 4)

This alternative addresses the option of installing additional surface water treatment capacity in an amount sufficient to replace the system demand provided by the Kellogg-Deering well field. To accomplish this alternative, a new water treatment plant functionally equivalent to the present surface treatment plant would be required. This system would utilize conventional water treatment technologies like chlorination, sand filtration, and other typical treatment technologies. To install a new surface water treatment plant, a new influent supply line would have to be built from the reservoir system to the plant. Similarly, a new treated water supply connection would have to be installed from the new treatment plant to the existing surface water treatment facility. The existing reservoir safe yield is 5.25 mgd. The daily production of the existing surface water system in 1984 was near this capacity (approximately 5.10 mgd). The evaluation of well field production indicates that the safe yield of the reservoir would be exceeded if a new surface water treatment plant were constructed or the existing plant expanded.

ACTIVATED CARBON TREATMENT (Alternative 5)

Under this alternative an activated carbon treatment system would be used exclusively to remove contaminants from the groundwater (i.e. neither the stripper on Layne 1 or the aerator on Layne 2 would be used). Discharges from all wells would be routed to a series of activated carbon filtration columns. To satisfy design criteria for the system characteristics at the well field, twelve 12-foot-diameter vessels with 12-foot-deep carbon beds would be required. A monitoring program would also be part of this alternative.

Cost Evaluation [§ 300.68(h)(2)(ii)]

Cost summaries, including present worth analysis, for the five alternatives are shown in Table 2. Present worth calculations for future costs are based on a 10% discount rate. Future costs would be incurred primarily in the operation and maintenance of the remedy for an assumed 30 year period following remedial construction. Based on present worth analysis, alternatives 1 and 2 have the lowest costs among the alternatives. The cost for alternatives 1 and 2 are of the same order of magnitude. Alternatives 3, 4, and 5 have costs one order of magnitude higher than alternatives 1 and 2. Alternative 4 is the most expensive followed by 5 and the 3.

Technical Evaluation [§ 300.68(h)(2)(iii)]

Alternative 1 - Since there are no new treatment facilities as part of this alternative there are no technical factors to evaluate. The only issue to consider is the location of monitoring wells on the east side of the river. Some of these wells might

TABLE 2

COST SUMMARY KELLOGG-DEERING WELL FIELD

Alternative	Direct Capital Costs		
	Low	Base	High
No. 1	12,043	36,495	45,619
No. 2	40,311	69,751	87,189
No. 3	1,271,096	1,715,232	2,144,040
No. 4	2,441,594	3,487,991	4,534,388
No. 5	2,293,619	3,058,159	3,822,699

Alternative	Annual Operating & Maintenance Costs		
	Low	Base	High
No. 1	6,461	19,580	24,475
No. 2	6,461	19,580	24,475
No. 2 (YR-15 only)*	34,729	52,836	66,045
No. 3	114,347	346,506	433,133
No. 4	306,349	437,642	568,933
No. 5	137,122	415,520	519,400

Alternative	Present Worth Analysis		
	Low	Base	High
No. 1	74,000	222,000	278,000
No. 2	109,000	263,000	329,000
No. 3	2,355,000	4,998,000	6,247,000
No. 4	5,344,000	7,633,000	9,924,000
No. 5	3,592,000	6,994,000	8,743,000

* Storage tank repair after fifteen years of operation.

need to be relocated due to the potential construction of Route 7. The same is true of all alternatives involving monitoring.

Alternative 2 - Air stripping has been widely used at Superfund sites as well as in industry; thus, it can be concluded that this alternative is reliable and easy to implement. As the air stripper is already in place no construction problems are expected.

Alternative 3 - As discussed for alternative 2 air stripping is a very reliable process with proven performance. The same can be said for activated carbon treatment as it is commonly used. No installation problems are expected.

Alternative 4 - Since the safe yield of the reservoir system would be exceeded if this alternative is implemented, the alternative is unreliable.

Alternative 5 - See alternative 3 evaluation of activated carbon treatment.

Public Health And Environmental Concerns [300.68(h)(2)(iv)&(vi)]

The following were considered as part of the Public Health And Environmental Concerns Evaluation:

A. Carcinogenic Risk

B. CERCLA Compliance With Other Environmental Statutes and Expected Adverse Environmental Impacts

A. Carcinogenic Risk

The incremental carcinogenic risk for the five alternatives is listed in Table 3. This table shows the added risks associated with the chemicals detected at the well field which are either human carcinogens or probable human carcinogens (i.e. TCE, DCM, and benzene). The table lists groundwater risks after treatment by each of the methods described in the five alternatives. Surface water supplies (alternative 4) are not impacted by the contamination at the site; therefore, they were not considered in this analysis.

Alternative 4 exhibits the lowest incremental carcinogenic risk; however it has been stated that this alternative is technically unfeasible. The remaining alternatives can be ranked in order of increasing risk as follows: 3<2<5<1. The reduction in cancer risk achieved by alternative 3 is one order of magnitude better than 2 which is in turn one order of magnitude better than 5 and 1.

Contaminant concentrations at the well field are expected to increase ten fold over a period of thirty years. Carcinogenic risks would increase by one order of magnitude if the concentrations at the well field indeed become ten times higher.

TABLE 3

INCREMENTAL LIFETIME CARCINOGENIC RISKS

Alternative No.	Risk after treatment
1*	6.4 x 10(-5)
2	2.1 x 10(-6)
3	3.2 x 10(-7)
4**	
5	3.1 x 10(-5)

* The risk of untreated groundwater is 1.8 x 10(-4).

** Surface water supplies are not impacted by the contamination at the site; therefore, they were not considered in this analysis.

Note: Dilution is not considered in this analysis. Carcinogenic risks were calculated assuming a worst case scenario under which the population served by the NFTD becomes 100% dependent on well field water. It is also assumed that all four wells would exhibit the current highest levels of contamination detected. Such scenario could conceivably arise under a severe drought, or should the reservoir treatment system fail or if it cannot supply public demand.

B. CERCLA Compliance With Other Enviromental Statutes and Expected Adverse Environmental Impacts.

The NCP states that as part of the detailed evaluation of alternatives, the alternatives shall be evaluated in terms of whether they attain or exceed Applicable, Relevant, And Appropriate Requirements (ARARs). With respect to this site, no such ARARs were identified. Nevertheless, the NCP also states that relevant Federal criteria, advisories, and guidance and State standards shall be considered during the evaluation process. For this site, these include:

- Connecticut Air Hazard Limiting Values
- Connecticut Drinking Water Regulations
- National Drinking Water Advisory Council (NDWAC) recommendations
- Proposed Maximum Contaminant Level (PMCL), Recommended MCL (RMCL), and Proposed-Recommended MCL (PRMCL)
- Suggested Adjusted Acceptable Daily Intake (AADI)

Connecticut Air Hazard Limiting Values apply only to alternatives 1, 2, and 3 as these are the ones involving air contaminant emissions. As mentioned before, volatile organic emissions expected are less than those requiring treatment as specified by State of Connecticut guidelines.

The National Drinking Water Advisory Council (NDWAC) recommends, as a health goal for carcinogens, a risk level of 10(-6); nevertheless the NDWAC states that 10(-5) would be an appropriate target to strive for as an upper limit for risk.

Federal and State drinking water guidelines are shown in Table 4. Analysis for CERCLA compliance with other environmental statutes was based on current site conditions. The RMCL for carcinogens or suspected carcinogens is zero; therefore no alternative (except 4) meets the RMCL when considering well field contaminants.

Alternative 1 fails to meet PMCL for TCE. It satisfies all other guidelines. Adverse environmental impacts other than the current groundwater contamination are not anticipated under the no action alternative. No evidence of impact on surface water bodies is evident. Benthic and aquatic organisms do not appear to be at risk in either the site or the study area east of the site.

Alternative 2 meets all guidelines. Adverse environmental impacts are not anticipated under present and projected long term site conditions. An analysis of contaminant release as a result of volatile chemical emissions from the air stripper indicates that ambient air concentrations will not exceed applicable State guidelines (see Appendix A to the FS report).

Alternative 3 meets or exceeds available standards. The expected impacts from this alternatives are the same as for alternatives 1 and 2.

TABLE 4

EXPOSURE CRITERIA AND GUIDANCE FOR WELL FIELD CONTAMINANTS

FEDERAL (All values in ppb)

Chemical	RMCL	PMCL	PRMCL	AADI*
TCE	0	5	--	260
DCM	0	NR	--	350**
1,2 DCE	NR	--	70	NR
Benzene	0	5	--	25

* Not considering carcinogenic effects and assuming 100% contribution from drinking water.

** Life time Health Advisory assuming 20% contribution from drinking water.

STATE (All values in ppb)

Chemical	Limit
TCE	25 (expected to go down to 5)
DCM	25
Benzene	1
1,2 DCE	NR

NR - Not reported

Alternative 4 meets all standards. The adverse environmental impacts associated with this option are related to the destruction of habitat. Approximately 32 acres of habitat would be destroyed as part of the required construction. The contruction of the new plant, however, is not expected to have an appreciable impact on native species of animals. It is not believed that any endangered species exist in the area.

Alternative 5 fails to meet PMCL for TCE, but satisfies all other guidelines. The expected impacts under this alternative are the same as for alternative 1.

None of the five alternatives would have any impact on the 100 year flood plain of the Norwalk River.

Innovative And Alternative Technologies [300.68(h)(2)(v)]

As mentioned before, it was innapropriate to consider this criterion in the detailed analysis of alternatives for the first operable unit of the Kellogg-Deering Well Field Site.

ADDITIONAL DATA

The time required to implement each alternative is presented in Table 5. The no action alternative is essentially in place with the exception of the implementation of an expanded monitoring plan. The time needed to implement such plan is expected to be minimal. Alternative 2 can be implemented in twelve weeks as only repairs are neeeded to bring the system into operation. Alternatives 3, 4, and 5 would take longer as design, bidding, and construction would be required. Alternatives 4 and 5 would take over a year to implement while alternative 3 would take 36 to 44 weeks.

COMMUNITY RELATIONS (See Appendix II)

CONSISTENCY WITH OTHER ENVIRONMENTAL REQUIREMENTS

Consistency with other environmental requirements is discussed in the Detailed Analysis of Alternatives section above.

RECOMMENDED ALTERNATIVE

Section 300.68 (i) of the NCP states that the appropriate extent of remedy should be determined by the lead agency's selection of a cost-effective remedial alternative which effectively mitigates and minimizes threats to and provides adequate protection of public health and welfare and the environment. Consistent with the NCP and based on the evaluation of cost and effectiveness of each alternative, the comments received from the public and the Connecticut Department of Health Services, Alternative 2 has been determined to be the cost-effective and most environmentally sound alternative.

The recommended alternative is considered an operable unit remedial action consistent with the NCP and EPA policy. This operable unit remedial action for air stripping treatment of well field groundwater is appropriate in order to assure a reliable

TABLE 5

TIME REQUIRED TO IMPLEMENT REMEDY
KELLOGG-DEERING SITE OPERABLE UNIT NO. 1

	Alternative Number				
Activity	1	2	3	4	5
Design Engineering	N/A	N/A (1)	12-14 weeks	26-30 weeks	26-30 weeks
Bidding	N/A	6 weeks	8-10 weeks	8-10 weeks	8-10 weeks
Construction	N/A	6 weeks	16-20 weeks	16-20 weeks	16-20 weeks
	N/A	12 weeks	36-44 weeks	50-60 weeks	50-60 weeks

NOTES:

(1) New Air Stripper is already constructed.
Storage tank must be repaired.

N/A Not Applicable

supply of safe, potable water to the public dependent on the well field. The recommended alternative provides for packed tower aeration treatment for 1,750 gpm of contaminated groundwater. The treatment system will be 99% efficient in the removal of TCE, the contaminant of most concern. The unit's removal efficiency will provide water at the 10(-6) incremental lifetime cancer risk level. The alternative satisfies all appropriate Federal and State criteria and standards for the contaminants detected at the well field. In addition, the alternative requires proper monitoring of both the treatment system's performance and the migration of contaminants toward the well field.

The direct capital costs for the recommended alternative are $69,751. These cost do not include design and installation of the air stripping unit as the NFTD has already incurred such expenses. They include repairs necessary in order to bring the air stripper into operation, and capital costs associated with the monitoring program. Annual operating and maintenance (O&M) costs are $52,836. Of this amount, $19,580 correspond to the required monitoring program. The remaining O&M costs represent the expected repairs needed for the storage tank after fifteen years of operation. The present worth cost of the recommended alternative is $263,000.

The recommended alternative is technically feasible, provides adequate public health protection (i.e. satisfies all guidelines), and has low environmental impact. It achieves these goals at a present worth cost of $263,000. Table 6 summarizes, for comparison, the detailed analysis of alternatives. Below is a brief discussion of why the other alternatives were not recommended.

Alternative 1 is technically feasible, has low environmental impact and costs essentially the same as the recommended alternative. However, it does not provide adequate public health protection and fails to consider projected increases in contaminant concentrations at the well field.

Alternative 3 is technically feasible, has low environmental impact and exceeds available guidelines to protect public health. However, the cost of this alternative is well over 10 times the cost of the recommended one.

Alternative 4 provides adequate public health protection, but it is technically unreliable. In addition its costs exceed those of alternative 2 by several million dollars, and it has some negative environmental impacts associated with it.

Alternative 5 is technically feasible and has low environmental impact. However, it fails to provide adequate public health protection and its costs are also over 10 times those of alternative 2.

For the reasons listed above, alternatives 1,3,4, and 5 have not been recommended.

OPERATION AND MAINTENANCE

The projected O&M activities required to ensure the effectiveness of the remedy include a monitoring program, repairs to the storage tank, and periodic inspections of the air stripping unit. The on-site minitoring program will consist of the following:

a) daily monitoring of raw and air stripped water during the

TABLE 6

COMPARISON OF REMEDIAL ALTERNATIVES KELLOGG-DEERING SITE

OPERABLE UNIT 1

Alternative No.	Present Worth	Technical	Risk (Adult)	Public Health*	Environmental Impact	Time to Implement
1	222,000	F	6.4 x 10(-5)	NO	low	--
2	263,000	F	4.0 x 10(-6)	YES	low	12 weeks
3	4,998,000	F	3.4 x 10(-7)	YES	low	36-44 wee
4	7,633,000	U	--	YES	low	50-60 wee
5	6,994,000	F	3.0 x 10(-5)	NO	low	50-60 wee

F: Feasible

U: Unfeasible

* Considers compliance with available guidelines under current site conditions only.

first week of operation. If the unit proves to be performing adequately it will be used for public water supply. Adequate performance implies compliance with the available Federal and State criteria and standards.

b) after (a) is completed, weekly monitoring of raw and treated water for a period of three months will be conducted. At the end of that period the monitoring program will be evaluated to determine the need to continue monitoring on a weekly basis. Monthly samplings should be expected for the first year of operation.

c) quarterly sampling of the production wells not in use for public water supply. If in use, weekly sampling will be required. It is required that any well water used for public water supply is first treated by the air stripper on Layne 1. Exceptions to this requirement must be approved, prior to implementation, by the EPA. Any water used for public supply must satisfy available Federal and State criteria and standards.

d) yearly inspections of the air stripper unit to ensure proper functioning.

e) during trial and operation of the air stripper, stack and/or ambient air monitoring will be required to verify that emissions are not violating applicable standards or guidelines and are not causing any threat to public health.

The off-site monitoring program includes quarterly samplings of seven monitoring wells on the east side of the river. Monitoring will allow for early detection of possible deterioration of the water producing aquifer. Such early detection will give appropriate time to take any needed corrective action at the well field. The wells to be monitored are 6M, 6D, K2A, K2B, K-8(or MW-3), 15, and 15R as shown in Figure 3-1 of the RI. Some of these may have to be relocated due to construction of Route 7. Coordination with the Connecticut Department of Transportation will be required. In addition, monthly monitoring at four points in the distribution system to be approved by the EPA will be required for the first three months of operation. Need for additional monitoring will be evaluated at the end of that period.

It is expected that the storage tank will require additional repairs after fifteen years of operation.

Prior to the operation of the stripper, the air stripper unit must be approved by th Connecticut Department of Health Services.

It is anticipated that all O&M activities will be conducted by the NFTD under an appropriate agreement with the EPA to be prepared in coordination with this document. The estimated annual O&M costs are $52,836 for a period of thirty years.

FUTURE ACTIONS

Additional studies will be required at the Site as part of the second operable unit. Such studies will serve to further characterize and/or identify potential source areas and to gather sufficient information to determine the necessity for and proposed extent of remedial action to address such source areas.

APPENDIX II

COMMUNITY RELATIONS

KELLOGG-DEERING WELL FIELD SITE
NORWALK, CONNECTICUT

COMMUNITY RELATIONS

Community interest in the Kellogg-Deering Site began in 1975 when contamination in the wells was first detected. Public interest began to increase in September 1983 when the Kellogg-Deering Site was listed on the National Priorities List (NPL). By early 1984, the Connecticut Citizen Action Group (CCAG), a statewide organization involved in consumer and environmental issues, began contacting Norwalk residents to organize a group of citizens, called the Waterforce, with concerns about the well field contamination. On July 11, 1984 the EPA held a public meeting to discuss the RAMP for the site. Approximately 65 residents attended, including members of the Waterforce. Since the summer of 1984 little public action has occurred at the site.

A public meeting to describe the RI and to respond to citizens' questions was held on May 22, 1986 at the Norwalk Public Library. Approximately 30 persons attended, including citizens, potentially responsible parties, and representatives of the local Water Board. A second informational meeting was held on July 17, 1986, at the same location, to discuss the FS. On July 31, 1986 a public hearing was held at the same location to record comments by the public, including potentially responsible parties. Comments were given by one private citizen and by three potentially responsible parties. Written comments from some of the same parties and additional parties were received during the remainder of the public comment period. These comments and EPA's responses are included in the attached responsiveness summary. In addition, the comments are summarized below. The public comment period on the RI/FS was open from July 17, 1986 to August 7, 1986.

The State of Connecticut Department of Health Services favored packed tower aeration, GAC filtration, and aeration with GAC filtration rather than expansion of the existing conventional treatment facilities, activated carbon treatment modules, production well management, and purchasing from an adjoining water supply. One potentially responsible party (PRP) stated a preference for final implementation of the existing air stripper. Several PRPs proposed purchasing water from an adjoining supply. One PRP stated that air stripping with activated carbon treatment, surface water treatment expansion, and activated carbon treatment were more expensive, but not more protective of public health, than air stripping. One PRP stated a preference for further consideration of the "No Action" alternative. Several PRPs objected to having two operable units, citing that this would not result in a comprehensive, overall solution.

A citizen was concerned that there might be technical oversight in the air stripper alternative recommendations.

to determine the need to continue monitoring on a weekly basis. Monthly samplings should be expected for the first year of operation.

c) quarterly sampling of the production wells not in use for public water supply. If in use, weekly sampling will be required. It is required that any well water used for public water supply is first treated by the air stripper on Layne 1. Exceptions to this requirement must be approved, prior to implementation, by the EPA. Any water used for public supply must satisfy available Federal and State criteria and standards.

d) yearly inspections of the air stripper unit to ensure proper functioning.

e) during trial and operation of the air stripper, stack and/or, ambient air monitoring will be required to verify that emissions are not violating applicable standards or guidelines and are not causing any threat to public health.

The off-site monitoring program includes quarterly samplings of seven monitoring wells on the east side of the river. Monitoring will allow for early detection of possible deterioration of the water producing aquifer. Such early detection will give appropriate time to take any needed corrective action at the well field. The wells to be monitored are 6M, 6D, K2A, K2B, K-8(or MW-3), 15, and 15R as shown in Figure 3-1 of the RI. Some of these may have to be relocated due to construction of Route 7. Coordination with the Connecticut Department of Transportation will be required. In addition, monthly monitoring at four points in the distribution system to be approved by the EPA will be required for the first three months of operation. Need for additional monitoring will be evaluated at the end of that period.

It is expected that the storage tank will require additional repairs after fifteen years of operation.

Prior to the operation of the stripper, the air stripper unit must be approved by th Connecticut Department of Health Services.

It is anticipated that all O&M activities will be conducted by the NFTD under an appropriate agreement with the EPA to be prepared in coordination with this document. The estimated annual O&M costs are $52,836 for a period of thirty years.

FUTURE ACTIONS

Additional studies will be required at the Site as part of the second operable unit. Such studies will serve to further characterize and/or identify potential source areas and to gather sufficient information to determine the necessity for and proposed extent of remedial action to address such source areas.

COMMUNITY RELATIONS RESPONSIVENESS SUMMARY
KELLOGG-DEERING SUPERFUND SITE
NORWALK, CONNECTICUT

INTRODUCTION

This community relations responsiveness summary for the Kellogg-Deering site documents for the public record concerns and issues raised during remedial planning, comments raised during the comment period on the remedial investigation/feasibility study, and the responses of EPA to these concerns.

The responsiveness summary is divided into the following sections:

Section I. Overview. This section discusses the site history and EPA's proposed alternative for remedial action.

Section II. Background on Community Involvement and Concerns. This section provides a brief history of community interest and concerns raised during remedial planning activities at the Kellogg-Deering Site.

Section III. Summary of Major Comments Received During the Public Comment Period and the EPA Responses to the Comments. Both written and oral comments on the remedial investigation/feasibility study are provided. EPA responses to these major comments are also provided.

Section IV. Remaining Concerns. This section describes remaining community concerns that EPA should be aware of in conducting the remedial design and remedial action at the Kellogg-Deering Site.

In addition to the above sections, Attachment A, included as part of this responsiveness summary, identifies the community relations activities conducted by the EPA during remedial response activities at the Kellogg-Deering Site.

OVERVIEW

The Kellogg-Deering Site is a public supply well field located along the western bank of the Norwalk River in Norwalk, Connecticut. The primary source of water to the Norwalk First Taxing District (NFTD) is surface water, however, the production wells contribute between 15 and 35 percent of the NFTD water supply. The primary environmental concern at the Kellogg-Deering Site is the contamination of groundwater. Trichloroethylene (TCE) was discovered in the groundwater at the well field in 1975. Subsequent investigation revealed other volatile organic contaminants in the groundwater.

The remedial investigation verified that the source(s) of contamination are east or northeast of the well field. The water treatment and distribution system are now referred to as Operable Unit #1. The potential source areas are termed Operable Unit #2. Rather than waiting for additional investigative studies to fully define the source area(s), a remedial investigation (RI) and a feasibility study (FS) was conducted to evaluate remedial alternatives for reducing contaminants at the well field.

The alternatives considered include:

- Alternative 1 (No Action)
- Alternative 2 (Air Stripping)
- Alternative 3 (Air Stripping Plus Activated Carbon Treatment)
- Alternative 4 (Expand Surface Water Treatment System)
- Alternative 5 (Activated Carbon Treatment)

BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Community interest in the Kellogg-Deering Site began in 1975 when contamination in the wells was first detected. From 1975 to 1983, the State and private parties investigated the site extensively to define the problem and identify sources of contamination. During this period, the State health department, the city health board and the city taxing district worked together to coordinate public information for the community. Public attention regarding the site began to increase in September 1983 when the Kellogg-Deering Site was listed on the National Priorities List (NPL), making it eligible to receive funds for cleanup under the Superfund Law. In late 1983/early 1984, a local group of citizens known as the Waterforce became active in monitoring the EPA cleanup plans for the site. While a number of different concerns were expressed by members of the Waterforce and other residents during the remedial planning activities at the site, a majority of these concerns were related to the groundwater contamination problem at the site.

These concerns and how the EPA addressed these concerns are described below.

1. Many residents have been drinking the water since 1975, when trichloroethylene (TCE) was first discovered in the well field, and are concerned over the potential health effects from the cumulative exposure to TCE.

   EPA Response: A health study to assess the impacts of previous contaminant exposure is impractical since TCE and the other contaminants found are quickly metabolized and excreted from the body.

2. Residents want to know what levels of contaminants are in the water and what levels are considered unsafe for drinking.

EPA Response: The current TCE level is 3 parts per billion ppb (after blending), which is below the Connecticut Department of Health Services TCE limit of 25 ppb (after blending). The excess cancer risk presented by consumption of this water at these TCE levels is not a health hazard requiring immediate action though EPA has evluated remedial action to mitigate long term exposure.

3. Members of the Waterforce and other citizens wanted the EPA to recognize their concern that an immediate activity remedy was necessary at the site.

EPA Response: In response to this concern, the EPA resampled the production wells and sent the results to the Center for Disease Control in 1984. Test results did not warrant any immediate response actions. About that time, the Norwalk First Taxing District Water Commission approved plans to construct an aeration tower to remove contaminants from the water supply. In February 1985, acting independently from the EPA, the Water Commission awarded a contract for construction of an air stripping unit and storage tank. The air stripper is expected to be operational in 1986.

Comments raised during the Kellogg-Deering Site public comment period are summarized below first for the Remedial Investigation (RI) phase then for the Feasibility Study (FS) phase. The comment period was held from July 17 to August 7, 1986 to receive comments on the feasibility study.

SUMMARY OF PUBLIC COMMENTS RECEIVED DURING PUBLIC COMMENT PERIOD AND AGENCY RESPONSES

Concerns Regarding the Remedial Investigation

1. A potentially responsible party consultant commented that the RI report does not provide information concerning the quantity of TCE discharged into groundwater within the study area, nor does the report attempt to assign percentages of the total volume of TCE in groundwater within the study area to different possible source areas. The commentors calculated that approximately 1500 gallons of TCE had been discharged within the study area, and concluded that this relatively low volume was characteristic of several small discharges rather than a single source. They also commented that the TCE found in areas downgradient of the primary source area identified in the RI Report could not have migrated from the RI/FS identified source area, based on the commentor's groundwater model (see Comment No. 3, below).

EPA Response: Per the National Contingency Plan (NCP), the RI/FS process serves the purpose of gathering sufficient information to determine the necessity for and proposed extent of remedial action. For the Kellogg-Deering Well Field Site (where sources were unknown at

the beginning of the investigation) and in particular for the first operable unit such information included:

a) nature, type, concentrations, and frequency of detection of contamination

b) carcinogenic risk associated with the contamination detected at the well head

c) current data on surface system and well field use and capacity

d) current guidelines and standards for the protection of public health and welfare, and the environment

Quantification of TCE releases and allocation of percentages of TCE volumes in groundwater to potential source areas were not needed to determine the necessity for and proposed extent of remedial action for the first operable unit of this site.

After review of the data, however, EPA disagrees that the volume of TCE discharged (estimated by the potentially responsible party consultant to be approximately 1500 gallons) is characteristic of several sources rather than one source. This quantity of TCE could have come from one or several sources. The relatively low discharge, however, more strongly supports the one source scenario than a multiple source scenario. The possibility of multiple secondary sources in addition to the primary source was stated as a part of the RI Report.

EPA disagrees with the application of the modelling effort used by the commentor to support its conclusion that TCE found downgradient of the primary source area identified could not have come from the source area. The variables used in the commentor's model did not correspond with actual field data (further discussion of the modelling effort is contained in the EPA response to Comment No. 3). Additionally, the commentor's analysis of groundwater flow from the identified source area shows that TCE from the source area could migrate throughout the study area, to the wellfield.

2. The comment was received from a potentially responsible party consultant that the RI Report did not present an analysis of ground water flow paths from the site property, or from other parts of the study area. The consultant concluded that the TCE found downgradient of the source area could not be attributed to the source area. It also concluded that the TCE found downgradient of the source area was from other sources and that this TCE was responsible for the well field contamination.

EPA Response: The RI Report does present a groundwater flow path analysis, both in the RI and FS text and in several figures. EPA disagrees with the conclusion that the TCE found downgradient of the primary source area could not be attributed to the source area, while

overburden and bedrock indicates that groundwater migrates from the primary source area through the study area towards the well field, (as did the RI). The commentor's discussion of groundwater flow within fractures in the bedrock underlying the study area is oversimplified in view of the known subsurface geology and unrealistic as it does not incorporate field verified fracture orientations and intersections data collected during the RI.

3. The comment was received that the model used in the RI Report was unrealistic in scope and too narrow in focus. Exception was taken to some of the input values used. The commentor modelled TCE migration using alternate input values, and concluded that TCE from the primary source area identified in the RI Report could not have reached beyond Plattsville Avenue at this time.

   EPA Response: The objective of the model used in the RI was to determine the "worst-case TCE contamination level at the well head" scenario. The model was then used to evaluate the maximum risk possible if well water went untreated. The input parameters used were based on actual field data, and represent the most accurate values currently available. The model presented by the commentor was used for different objectives and input values were used which were not supported by field data or observations. The commentor's model assumed groundwater flow through low permeability till deposits where actual flow was through high permeability stratified drift deposits, or in some cases, through bedrock. The input values used by the commentor for groundwater migration rates were much lower than actual values, leading to a much slower groundwater migration rate then predicted in the RI Report which used field generated data.

4. The comment was received that TCE spills upstream of Deering Pond could have migrated into the pond and settled to the bottom of the pond, where the TCE would eventually migrate to groundwater and be the source of TCE contamination to the well field and to monitoring wells adjacent to the river. The comment was also made that small TCE spills into the river could flow to the well field, resulting in well field contamination that has been found.

   EPA Response: EPA feels that the likelihood of TCE spills which may have settled into Deering Pond being the source of TCE to the well field or nearby monitoring wells is very low. Historic sampling data has shown that Layne 1 and Layne 2 are consistently the most contaminated wells in the well field. These wells are the furthest of the wells from Deering Pond. The Deering wells, located much closer to the ponds than the Layne wells, consistently pump water with much lower TCE concentrations, which is the opposite of what would be expected if one or both ponds was the source of TCE to the well field. The TCE found at monitoring well also close to Deering Pond, and they consistently yielded very low concentrations of TCE in groundwater, this scenario seems unlikely. It is EPA's opinion that the source of the TCE found in monitoring wells at

locations 9 and 6 is most likely from a source area upgradient of the wells, rather than downgradient. The possibility of TCE in surface waters flowing past the well field being the source of the contamination in the well field is also unlikely, as there are 11 years of data showing relatively consistent levels of TCE in the well field, with virtually no TCE being found in adjacent surface waters over that time period. The consistent presence of TCE in the well field suggests a steady discharge to groundwater instead of an occasional slug of TCE migrating to the well field via a surface water route.

5. Potentially responsible parties were concerned that the RI Report, "unduly concentrates on Zone 1 as the primary source of contamination" although other sources may exist.

EPA Response: The conclusions presented in the remedial investigation are the result of evaluation of EPA collected data, review of historic data, and review of additional concurrent (potentially responsible party, state of Connecticut, and Norwalk First Taxing District) investigations.

The data indicate:

- o The aquifer (groundwater) north, west, and south of the site has little, if any, TCE in it.
- o The surface water adjacent to the site has no TCE in it. (No long term concentrations have been found.)
- o The aquifer east of the site (which supplies the well field) consistently has TCE and other contaminants in it. Within the study area, maximum concentrations of TCE, (a minimum of one magnitude of order greater) were consistently detected in the vicinity of Main Street (Zone 1). Zone 1 is upgradient of Zones 2, 3, and 4 (well field). Groundwater quality in Zones 2, 3, and 4 is impacted by upgradient groundwater contamination For these reasons Zone 1 is identified as the "primary" source area. Source areas in Zones 2 and 3 may exist, their impact is significantly less (i.e., one to two magnitudes of order less) and these additional sources are therefore, identified as "secondary" source areas (see Section 6.4 of the RI for a detailed discussion).

6. Potentially responsible parties indicated that significantly more subsurface testing is needed to identify the source or all sources of contamination.

EPA Response: Additional testing may be required to identify all sources (regardless of contribution amounts). Additional data is required to design and implement appropriate source clean up options. EPA believes the zone of major TCE contamination has been identified.

7. Potentially responsible parties (PRPs) were concerned with the ability of any individual (e.g., PRP) to investigate additional PRP's due to the nature of the site. The contamination is moving in groundwater beneath private property and PRP's do not have authority to conduct investigations on such property.

EPA Response: The purpose of any additional investigations will not be for one PRP to investigate another, but to determine the need for and proposed extent of remedial action in relation to the second Operable Unit for the site.

8. Potentially responsible parties (PRP's) were concerned that the surface water characteristics were not assessed in greater detail. Additionally, the surface water dilution of the groundwater would reduce risks and the PRP's were concerned that this risk reduction was not evaluated.

EPA Response: The risk assessment presented in the RI (See page 7-21) was calculated from maximum observed concentrations at the well head. The groundwater at the well head has already been diluted by Norwalk River recharge to the aquifer. The risk analysis considered a worst case scenario under which the public served by the NFTD becomes 100% dependent on well field water. It has been determined that such scenario could arise under certain realistic conditions; therefore, it was appropriate to consider 100% dependence as the basis for the risk analysis.

9. A responsible party expressed a need for the soil analysis data and soil sample collection points, which were known to a Field Investigation Team, but not included in the RI.

EPA Response: The remedial investigation (RI) study included detailed data regarding efforts (analysis type, procedures, locations, results, etc.) for samples collected during the remedial investigation. The RI also summarized data presented in other historic or ongoing studies. Data from these studies was summarized in Appendix A of the RI. Efforts were made to include all relevant information. The Field Investigative Team soil analysis data was qualitative in nature and therefore not discussed in detail; however, this information is provided in the report titled "Matheis Court Property Site Final Preliminary Assessment/Site Inspection Report, Norwalk, Connecticut, August 23, 1985," and can be obtained from the U.S. EPA.

Concerns Regarding the Feasibility Study

1. The State of Connecticut Department of Health Services (DHS) agreed that conventional treatment, activated carbon treatment modules, purchase from adjoining pubic water supply (due to loss of use of 3.5 MGD safe yield), selective dilution of treated well water (additional population not

already exposed to water with low level contaminants would then be exposed), and production well management should be screened out.

The DHS indicated that the no action option was unsatisfactory as the 5 microgram/liter proposed maximum contaiminant level (MCL) for trichloroethylene would be exceeded. The expansion of the existing surface water treatment system was not feasible due to a lack of safe yield. The only options that should be considered are: packed tower aeration, GAC filtration, and aeration with GAC filtration. The DHS also noted that the aerator on the Layne 2 production well is inadequate and the design of the newly installed air stripper had not yet been approved by the DHS. Also, the DHS was concerned that removal efficiencies presented in the FS for activated carbon treatment seemed low and recommended treatability studies be conducted for better evaluation. Finally, DHS states that the study incorrectly indicates that the Deering wells are relatively free of contamination.

EPA Response: The recommended alternative (air stripping) is one of the options that DHS suggests for consideration. This alternative will require compliance with the 5 ppb limit for TCE and air stripping treatment of all well field water used for public supply. The removal efficiencies presented on page 4-23 of the feasibility study (95% for monocyclic aromatics and 80% for halogenated aliphatic hydrocarbons while conservative, are standard design removal efficiencies for the specific contaminants of concern (Conway, R.A., and R. D. Ross. Handbook of Industrial Waste Disposal Van Nostrand Rheinhold, NY, NY, 1980 (Page 179-180). Treatability studies are necessary for actual activated carbon treatment design. However, as discussed above, the removal efficiencies presented in the FS are adequate for evaluation purposes. Contaminant concentrations detected in the Deering wells were low relative to those detected in the Layne wells. For example, the March 1985 samples showed no contaminants detected in Deering 1 and 4 ppm TCE. 86 ppm TCE were detected in Layne 1 and 64 ppm TCE in Layne 2. However, the possibility of contaminant increase is documented in the RI and FS reports.

2. One potentially responsible party recommended that Alternative 2 (completion of the installation of the air stripper already in place) be selected as it reduced risk at a modest cost relative to the other action alternatives.

EPA Response: The selected alternative is indeed Alternative 2, which after analysis and comparison proved to be the most cost-effective and most environmentally sound alternative for Operable Unit #1 of the Kellogg-Deering Well Field Site.

3. Several potentially responsible parties expressed concern that the "purchase water from adjoining municipalities" alternative was deleted.

EPA Response: Purchasing water from adjoining municipalities was considered in the FS as a remedial technology and was rejected from further consideration due to its unreliability and failure to contribute to a permanent solution to the contamination problem at the site.

Purchasing water from adjoining municipalities would not serve to treat and/or destroy the existing contamination. In addition the Connecticut Department of Health Services has stated its concerns for the loss of the available safe yield from the well field if the purchase option were implemented.

4. One potentially responsible party was concerned that the study did not adequately define the existing and anticipated water demand in the Norwalk First Taxing District. Additionally the concern was expressed that a proper assessment (based on demand) was not presented so that a determination of which well or combination of wells which were actually needed could be made.

EPA Response: The projected demand for water within the NFTD was based on water usage from both the reservoir and well field up to and including 1985 actual rates. Existing demand was defined based on most recent available data (e.g. see page 1-10 of the Feasiblity Study). In the NFTD fiscal year 1984, the filter plant contributed 1,900,887,000 gallons and the well field contributed 269,646,000 gallons (also see Table 3-1, Kellogg-Deering Well Field Water Production Analysis (1980-1985)).

The well field supply was determined to be necessary to supplement the reservoir supply. As all wells contain contamination to one degree or another, the remedial option selected would be required by any or all wells. Layne 1 is the preferred well because it has the greatest production capacity. Wells can be used individually or manifolded prior to treatment thereby keeping the flexibility of multi-well usage at minimal cost. As discussed above, the Connecticut Department of Health Services (DHS) was concerned about the potential loss of the 3.5 MGD safe yield of water to the public.

5. One potentially responsible party expressed concern that Alternatives 3, 4, and 5 (air stripping and carbon absorption, surface water treatment expansion, and activated carbon) were not eliminated during the cost screening evaluation as these alternatives were greater in cost yet did not provide greater public health or environmental protection than Alternative 2.

EPA Response: Cost screening refers to the initial screening of alternatives as per Section 300.68 (g) of the National Contingency Plan (NCP). The FS guidance provides an order of magnitude analysis for the initial cost screening. All alternatives presented in the FS for detailed analysis passed the order-of-magnitude cost screening. Alternatives which exceeded others by one order of magnitude either exceeded available public health standards, or offered better engineering reliability, or provided further protection of the environment, or exhibited a combination of any of these factors. Therefore they passed the initial cost screennng evaluation.

6. Potentially responsible parties felt that the "at the tap" health risks during peak demand and the "No Action" Alternative was not adequately considered. Specifically:

a) The characterization of the public health risk had not been adequately addressed with respect to the dilution of well field water with surface water from the reservoir and contamination in surface water from the reservoir, or as a result of water treatment.

b) A detailed analysis of current and expected water demand within the NFTD was not conducted.

c) The FS does not take into account the newly constructed air stripper.

EPA Response:

a) Dilution was considered, however, it was recognized that a small portion of the population served by the NFTD may receive on occasion, as much as 100% of their potable supply directly from the well field. The dilution considered was from mixing of groundwater from the contaminated well and (after aeration) with the less contaminated wells (@ 1:1 dilution). The intent of the public health assessment is to characterize the risks to persons exposed to the greatest concentrations, not to characterize the risk incurred by each and every individual. Hence, the actual mechanics of the distribution system are irrelevant in this regard.

The presence of contamination in surface waters has not been documented. No data have been generated that indicate that chlorination or other water treatment processes conducted by NFTD result in risk to the public, (rather, such treatments are designed to mitigate exposure to water-borne disease, thereby protecting the public health).

Even if water-treatment related carcinogenic risk could be identified, it would not establish a background against which the risk attributable to well field contamination could be weighed. The carcinogenic risk model adopted by EPA treats carcinogenic effects additively. Thus, the presence of contamination in the well field would become even more critical if such a hypothetical scenario existed.

b) This portion of Comment No. 6 is discussed in detail under Comment No. 4. In summary, the FS did use existing water supply use data.

c) The newly installed NFTD stripper is discussed in detail and comprises the bulk of the technical recommendations for Alternative No. 2. No. 1, the "No Action" Alternative, does not consider the benefits of the NFTD stripper as the stripper, although constructed and in place, was not operational at the time of preparation of the FS. The "No Action" alternative must represent the present site situation, because the newly installed stripper is not operational, its treatment capabilities could not be evaluated under the "no action" alternative. As previously stated, the NFTD stripper capabilities are considered under Alternative No. 2.

7. A private citizen was concerned with possible technical oversight in the FS regarding the air stripper alternative recommendations. Specific concerns were:

a) The implication that "trihalane methane compounds can be removed by the air stripping method"

b) The need for pure air to enter the air stripper to protect the public from airborne particulates and organic materials, etc.

c) The need for removal of airborne pollutants of polychloro, monochloro and other organic compounds from air stripper emissions

d) The need to prevent the "unnamed" small stream on the wellfield boundary from recharging the aquifer and contaminating the aquifer with polychloro and other organic contaminants.

EPA Response:

a) The concern over the effectiveness of air stripping of trihalomethanes (particularly chloroform) is warranted, but not entirely applicable. The only trihalomethane detected at the well field was chloroform, which was detected in trace amounts; therefore, it is not of concern. The air stripper's removal efficiency for the other chemicals detected at the well field will satisfy current guidelines regarding the protection of public health.
Note that during the remedial investigation, chloroform was detected in [illegible] of the [illegible] samples collected from the well field and was

Reproduced from best available copy.

not detected in samples from the production wells themselves. (The analytical results for samples submitted to the EPA contract labs are subjected to extremely rigorous quality assurance/quality control.)

The data for the contaminant plume to the east of the well field do not indicate that chloroform contamination is extensive or highly concentrated. In our best judgment, it is believed that the packed column at the wellfield will be adequate to remove chloroform from the well field water. The operation and removal efficiency of the stripper will be monitored as a matter of course to assure that it performs satisfactorily.

b) The air stripping technology under consideration is neither developmental or innovative. It is presently being used with great success at a number of locations nationwide. To our knowledge, purified air is not supplied at any of these sites. No adverse impacts such as you have described have been documented.

In particular, the water from the stripper will be treated by the NFTD prior to distribution; any bacteria will be eliminated during water treatment. Entrained particulates will also be removed via filtration. Concentrations of chemical in the ambient air will be so low that a concentration gradient (driving force for mass transfer) will be virtually non-existent.

c) An assessment of the emission of volatile organic pollutants from the air stripper was conducted. These emissions are expected to disperse rapidly. In reality, the volatile pollutants are quite amenable to photolytic degradation once they reach the atmosphere. The theoretical emission rates do not exceed guidelines established by the State (Connecticut) even under presumed worst case conditions.

d) Historic data indicates that few constituents were detected in the unnamed stream adjacent to the well field. Furthermore, the stream recharge to the aquifer is negligable compared to the recharge from the Norwalk River and the yield from the aquifer east of the river.

8. A private citizen was concerned with the completeness of the evaluation conducted regarding effectiveness and cost of activated carbon filters in removing chloroorganic and other solvent type contaminants.

EPA Response:

Activated carbon units are presently in use for treatment of TCE-

contaminated groundwater at numerous locations across the nation. The performance of these units has been monitored, and the results have demonstrated their effectiveness in removing TCE and other chlorinated hydrocarbons. A great deal of literature is available regarding carbon adsorption partial coefficients, carbon consumption rates, and regeneration of spent units. Operation of adsorption units in series (lead/lag) assures that contaminant breakthrough will not occur (even if suspended solids foul the first unit). Filtration can easily remove any suspended solids prior to entry to the carbon units. Little variance in pH is anticipated through the system so that precipitation of dissolved solids is not expected. pH control can assure that this does not occur. Once again, these are aspects that must be considered during the design phase.

When the adsorptive capacity of the lead unit expires, the 2nd unit will effect removal while regeneration or replacement of carbon in the front unit takes place. The removal adsorption capacity of the revitalized carbon can be determined during this maintenance period. If the spent carbon cannot be regenerated, it can be replaced. Annual costs for operation and maintenance of those units (including an itemized cost for carbon consumption) are included in Appendix D of the Feasibility Study.

9. It was noted by a private citizen that there was a need for a schematic representation of the air stripper.

   EPA Response: The figure in Appendix C of the Feasibility Study report is a schematic representation of the Air Stripper. It is not an "as built" drawing.

10. A private citizen expresssed a need for a more detailed description of the specific sampling methods used and the reliability of these methods.

    EPA Response: EPA agrees that data quality must be ensured and has developed procedures for collection, preservation, and transportation of samples; the calibration and maintenance of field and labortory instruments; and the processing, verification and reporting of data. The Kellogg-Deering data was reviewed and validated by Region I EPA to ensure that proper sampling procedures were used by the contractor and proper analytical techniques were used by the labortory conducting the analysis. The laboratories used are approved under the EPA Contract Laboratory Program (CLP). Samples not meeting the requirements of this program are rejected. Only approved, validated data are used in the decision making process.

Specific analytical methods are not generally included in th RI or FS reports. Methods used are described in detail in the following two publications available from U.S. EPA.

For Organic Contaminants:

U.S. EPA Contract Laboratory Program - Statement of Work for Organic Analysis (Multi-media, Multi-concentration), May 1985.

For Inorganic Contaminants:

U.S. EPA Contract Laboratory Program - Statement of Work for Inorganic Analysis (Multi-media, Multi-concentration), July 1984.

11. One responsible party expressed concern regarding the time allotted for comments on the FS in view of the short period of time between the issuance of the RI and FS.

EPA Response: The time alloted for comments on the FS was appropriate and consistent with all requirements per the National Contingency Plan (40 CFR 300 et seq.).

12. Responsible parties did not agree with creating two operable units as source cleanup would possibly have reduced contamination at the wellhead. By splitting the site into two operable units, a comprehensive (for both operable units) overall solution was not selected.

EPA Response: During the remedial investigation, aquifer contamination was verified east of the site and potential source area(s) identified beyond the site boundary. In order to reduce risk to the public in an expeditious manner, EPA proceeded with the RI/FS for the site under the original RI/FS objectives, but concurrently identified a second operable unit encompassing the source area.

There is a current need for well field water; therefore, treatment is needed as soon as possible. In addition, there is not enough information at this time to determine the need for and extent of remedial action relating to the site's second Operable Unit. Therefore, speculation on the impact of Operable Unit #2 on the remedy selected for Operable Unit #1 is premature and fails to address the currrent need for safe potable water. (continued on page 14 (a) attached).

13. A potentially responsible party was concerned that EPA failed to consider the acceptability of an incremental cancer risk greater than 10^{-6} in view of the fact that EPA accepts greater risks in certain circumstances.

EPA Response: It is EPA policy to try to reach the 10^{-6} level wherever possible. It has been shown that Alternative No. 2 (air stripping) which reaches this 10^{-6} risk level is cost effective and the most environmentally sound alternative when compared to others ranging from 10^{-4} to

The Agency recognizes the primary source of the contamination to be in the vicinity of Main Avenue where the soils are shallow and bedrock outcrops are numerous. We also recognize that additional studies may conclude that source control is the appropriate remedial action for aquifer clean up. By choosing aeration in the first operable unit, the Agency does not believe that this is the cost effective remedy for aquifer cleansing. However, we do feel because of the location of the primary sources of contamination and the uncertainty of fluid flow in fractured rock, that well head treatment by aeration is a necessity to ensure the protection of public health and the environment.

10^{-7} (see Kellogg-Deering, ROD document).

REMAINING PUBLIC CONCERNS

1. An interested citizen was concerned about what is being done to stop companies from polluting the groundwater?

EPA Response:

It is EPA's policy to attempt to identify parties responsible for contamination at all National Priorities List (NPL) sites. To date, nine PRP's have been notified of their potential liability in relation to groundwater contamination at the Kellogg-Deering Well Field Site.

Efforts to identify other PRP's continue as part of the enforcement activity at the Kellogg-Deering Well Field site. Through vigorous enforcement and coordination with state agencies these PRP's can be stopped from polluting the groundwater and required to clean up the contamination for which they are responsible.

2. An interested citizen questioned why it takes EPA such a long period of time to conduct these studies?

EPA Response:

The EPA became involved with this site through its Superfund program which began in 1980. In 1983 the Kellogg-Deering Well field was included on the NPL which made it eligible for Superfund money. In 1984 water contamination data at the wellhead was collected by the EPA and evaluated by the Centers for Disease Control (CDC) to determine the need for response action. The CDC determined that such actions were required: hence EPA proceeded to conduct a detailed investigation which lasted from 1984 to 1986. This investigation helped to identify sources of contamination and facilitated proposal of remedial actions to assure the provision of safe potable water to the public. The detailed nature of the investigation required two years for its completion.

ATTACHMENT A

COMMUNITY RELATIONS ACTIVITIES CONDUCTED AT KELLOGG-DEERING SITE

Community relations activities conducted at the Kellogg-Deering Site to date include the following:

- EPA and State officials held a public meeting to discuss conditions at the site (November 1983).
- Information repositories were established at the Norwalk Public Library and the Norwalk Town Hall.
- EPA held a public meeting to discuss plans for the Remedial Action Master Plan (RAMP) for the site (July 1984).
- EPA conducted on-site discussions with local officials and interested residents (March 1986) and prepared a community relations plan (June 1986).
- EPA issued progress and plans fact sheets during the RI/FS process (October 1985, April 1986).
- Remedial Investigation was released for public review and comment (April 1986).
- EPA held an informational public meeting to explain progress and plans at the site (May 1986).
- EPA held a public meeting at the Norwalk Public Library to describe the workplan for the RI and to respond to citizen's questions (May 22, 1986).
- Feasibility Study was released for public review and comment (June, 1986).
- EPA held a public meeting at the Norwalk Public Library to discuss the results of the FS and to respond to citizen's questions (July 17, 1986). Approximately 30 local citizens, officials and media attended the meeting. A fact sheet describing the cleanup options was distributed.
- EPA held a public hearing at the Norwalk Public Library to record comments from the public on the draft FS (July 31, 1986). A transcript of this hearing is available at the Norwalk Public Library.
- The public comment period on the FS lasted from July 17 until August 7, 1986.